

FINDING AND RECOMMENDATION(S)

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Submitted by: Airship Surveillance, Ltd.

Finding:

Key objectives

The key objective of this paper is to present an achievable persistent surveillance capability based on medium altitude, long duration airship technology. This technology, when coupled with advanced reconnaissance & communications systems, will provide firefighters with comprehensive situational awareness and the ability to communicate with virtually every firefighter at every echelon along the entire fire line. It will also provide the respective Governors with a complete picture of where the fire has been; where the fire is; and where the fire is going, so that Executive Level decisions can be made regarding the deployment of First Responders and other support personnel to assist the firefighters.

Conclusion: Persistent Surveillance is vital to Firefighters and Supporting First Responder Organizations

During the late summer-early fall 2007 California fires, unmanned Predator and Global Hawk air vehicles were employed to map the on-going fires and relay real-time imagery to the fire command center. The highly successful employment of these two platforms in support of the fire-fighting mission demonstrated the value of real-time persistent surveillance over fire scenes; however, the cost of such use is extremely high (the Predator costs approximately \$5,000 per flight hour to operate). Additionally, Predator vehicles are in high demand in overseas war zones. Likewise Global Hawk (\$26,500 per flight hour) is also task saturated in support of allied forces deployed in Afghanistan and Iraq.

Airship Surveillance, Ltd. (AirSur) proposes a low-cost, on-call platform capable of performing the same functions as Predator and Global Hawk, but from a lower altitude (5,000-15,000 feet above mean sea level - AMSL) and under the direct control of the California & Nevada Fire Fighting organizations. This support is in the form of unmanned airships operating initially in the Tahoe Basin starting in the summer of 2008. Carrying up to 1,000 pounds of communications and high technology sensor suites, the AirSur platform will facilitate interstate communications and provide a common operating environment to provide situational awareness to both California and Nevada first responder organizations. This capability is called "Fire Watch."

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Process for Developing
Findings and Recommendations¶
For the¶
CALIFORNIA-NEVADA TAHOE
BASIN FIRE COMMISSION¶

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<#>Anyone can propose a **FINDING** for consideration by the committees. This includes Commission members, agency staff, and members of the public. For the sake of consistency this should be done using the template (provided below) to document a proposed Finding, and to provide a short background statement to support or justify the proposed Finding. ¶

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<#>Findings should be submitted electronically to Commission staff (dana.cole@resources.ca.gov) so they can be logged in with a tracking number, and assigned to the appropriate committee for consideration.¶

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<#>If a majority of the committee agrees to consider a proposed Finding, the committee should develop one or more **RECOMMENDATION(S)** for consideration by the full Commission for forwarding to the Governors, including an analysis of the potential impacts of implementing the Recommendation(s).¶

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<#>The committees are responsible for identifying Findings and forwarding proposed Recommendations to the full Commission. They may also choose to assign working groups, committee members, and/or their respective staff, to develop the impact analysis of implementing Recommendations. (Please refer to the Findings and Recommendations Template, below.) ¶

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<#>Due to the March 21, 2008 deadline for submitting Findings and Recommendations to the governors, proposed Findings and Recommendations should be received no later than **February 15, 2008** to allow time for Commission consideration.¶

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Background and Supporting Evidence:

Wildfires are a perennial problem for California and Nevada. The 2006 & 2007 fire seasons were especially devastating and caused tremendous loss of human and animal life; destroyed hundreds of homes; devastated natural water sheds; blackened forests in both states. Most recently, the Angora Fire (which began on June 24, 2007 and was fully contained by July 2, 2007) burned over 3,100 acres and destroyed 254 homes. In order to chart a path for mitigating the effects of wildfires, the Governors of California and Nevada authorized the formation of a joint commission to study advanced technology and improved methods to individually and jointly combat the future fires. This paper is focused on a high technology approach to providing persistent aerial surveillance from airships in support the three major wildfire-related mission areas:

- Pre-Fire Management of Lands and Fire Fuels
- Real-Time Fire Management
- Post-Fire Consequence Management

The Airship Surveillance (AirSur), Ltd., offers a low cost, environmentally friendly alternative, which will provide persistent surveillance over the Tahoe Basin. This surveillance will be in the form of new generation airships (called the "L-15") operating at 15,000 feet (Above Mean Sea Level – AMSL) equipped with high technology sensors and communications equipment. These airships will become an integral part of each of the three wildfire-related mission areas and will be under the joint control of the California-Nevada Fire Marshals' offices.

The proposed program is entitled: "Fire Watch." The AirSur Team will draw sensor and communications support principally from California & Nevada-based companies. It is estimated that the entire Fire Watch system (platform & sensor suite) will cost less than \$2,000/hr to deploy and operate. It can be on-station performing aerial reconnaissance duties in support of Pre-Fire Management of Lands and Fire Fuels by June 2008 in support of California-Tahoe Basin fire prevention/fire fighting efforts.

Recommendations:

The military has long understood the value of persistent surveillance platforms deployed in support of forces when fighting an adversary. Fire Watch will provide the California and Nevada firefighting organizations with the ability to conduct fire support management operations during the pre-fire, real-time, and post-fire phases of each wildfire. Fire Watch will provide synergistic benefits to both states, as it will enable interoperable communications and a common operating picture at a low cost. It will remain under the control of state fire officials and provide on-call capability beginning in 2008.

Airship Surveillance, Ltd. is proud to offer the Fire Watch capability to the California-Nevada Tahoe Basin Fire Commission. The introduction of Predator and Global Hawk surveillance platforms in support of firefighting operations has clearly demonstrated the value of persistent surveillance platforms. Fire Watch is intended to build upon that experience and provide a low cost set of options to the Fire Commission.

AirSur respectfully recommends that the Fire Commission take the following steps:

- Allow AirSur to present a briefing in order to amplify the concepts presented in this paper and clarify any outstanding questions.
- Demonstrate the Fire Watch capability to designated First Responder representatives.
- Provide funding to field a limited Fire Watch capability in time for the 2008 Fire Season.

Impacts of Implementation:

Fire Watch airship operations have been designed as a year-round program to provide major assistance for the prevention, detection, containment and recovery from fires. The program would begin in 2008 (with reduced assets) followed by full implementation during 2009.

Bases of Operation

Two main bases of operation are proposed for the program: Crows Landing, CA and Pahrump, NV.

To cover northern parts of each state an operations base is proposed at Crows Landing Airfield in Stanislaus County, California (approximately 70 miles from Oakland). This former federal airfield is currently inactive as plans to re-develop it as a civilian facility are studied. The California Department of Forestry and Fire Prevention already propose to have a base for its fire fighting aircraft at the airport. A hangar and support facilities will be erected at the site.

To cover the southern areas of each state, the airships will operate from an airport to be build at Pahrump in Nye County, Nevada. This site has already been chosen as Airship Surveillance's home base and will function as the HQ for the project. It will be equipped with a hangar along with manufacturing, support and training facilities.

Ultimately, two airships or more airships will be based at each location to provide full coverage of both California and Nevada. Airships will deploy from these two main bases to satellite locations during the fire season and times of actual wildfire management. Each airship will

Pre-Fire Land Management

Outside of the fire season, the airships will operate in support of land management efforts. In addition to general surveying of large geographic areas of each state, they will provide high fidelity surveying of areas considered to have high fire risks. These operations will be conducted in coordination with other government and federal departments.

Sensors capable of determining the type and density of vegetation, moisture level in and above the ground plus a wide range of other conditions can be installed on the airships. The low speed and hover capability of the airships results in extremely high quality data being recorded.

In addition to duties directly related to the task of wildfire management, the airship may be made available for a wide range of additional roles for which persistent surveillance is required. Tasks such as search and rescue, border patrol, environmental monitoring and many others are all within the capabilities of the airships.

A small (3-5 personnel) permanent staff retained by the airship operating company will conduct all tasks during the fire 'off season' to minimize program costs. During these periods the airships will be manned and piloted to overcome any issues regarding airspace regulations.

During periods of high fire risk, the airships will be used to patrol areas considered to be at extreme threat. Such patrols will offer the highest possibility of detecting any fires at the earliest possible moment.

Real Time Fire Management

Depending on the size and threat created by a particular fire, a decision will be made to deploy one or two airships to support its containment. Two airships will be able to provide continuous coverage of a fire for extended periods measured in weeks, where a single airship will require downtime of between 8 and 12 hours every third day for maintenance considerations. The following Concept of Operations (CONOPS) details a two-ship deployment, which is the most complex.

The airships will be deployed to a staging area close to the incident. They can operate from any suitable clear area and do not need airport facilities.

Given that airships will be patrolling high-risk areas, it is very possible that any fires will first be spotted by an airship, in which case immediate surveillance duties will commence; in the event that a fire is first identified by other means, it is likely that an airship will be within a few hours response time.

Upon receiving the command to deploy to a remote fire, an advanced airship support ground party will depart and once it is assured of reaching the operating

area, the first airship will deploy. This first airship will likely be on site within a few hours of a deploy decision being initiated.

If required a second airship will be brought on site to enable around the clock surveillance that can last indefinitely.

The airship operation will be self-sustained. Full support equipment will include a mobile command center, sleeping quarters for the crew, maintenance facilities for the airship and a fueling capability. During this period of time, each airship will require a support crew of 3-5 people.

It is anticipated that restricted airspace will be established from the airships operating site to the fire area to allow unhindered flights in the unmanned configuration. Operations can be conducted at any altitude to 15,000 feet AMSL and will be closely coordinated with tanker and other aviation efforts. However, these are normally low-level operations will typically be several thousand feet below the altitude of the airship.

If possible, the airships will depart from satellite locations to the operating areas in the unmanned configuration; however, this cannot be guaranteed until the FAA has approved general clearance for unmanned aircraft to operate in regular airspace. This is not expected to happen until around 2015. If an airship has to transit to an operating area with flight crew aboard, it will immediately be outfitted for unmanned operations upon arriving at the operating site. Once over the fire, the airships will be stationed as needed to provide information requested by ground teams. It will remain clear of any dense smoke or burning embers that could potentially be hazardous. However, this does not limit the airship to operations upwind of the fire, a wide range of factors including wind direction and strength at altitude, type and size of the fire will likely interplay to allow the airship to operate in the vicinity of the fire as needed. The high speed and wide cross range capabilities of the airship will allow comprehensive monitoring of fires of all sizes.

Payloads will include visible and infrared imaging cameras, air sampling detectors, communications equipment and other sensors. This will make the airship a true multi-role platform able to monitor the status of the fire, relay real time data on the location and condition of assets on the ground (including firefighters), provide almost immediate information on the effectiveness of firebombing and provide a communications relay capability over terrain that would otherwise block transmissions.

L15 will have an on site capability of up to 48 hours depending on local conditions. In a two aircraft operation, the second airship will be deployed in time to relieve the first. Upon returning to base, an airship will return to base and immediately be serviced and made ready for operations again. Two vehicles will

be sufficient to provide around the clock operations for an extended period that cast last indefinitely.

Post Fire Management

The airship will be used for a large number of roles after a fire. In the immediate aftermath of a fire, they will provide an around the clock monitoring of hotspots and the coordination of dousing efforts. One airship can be kept on station for this work, while the second is deployed to another incident if necessary. In the long term they will provide assistance with general recovery efforts through surveying and other tasks.

The 2008 Fire Season

For 2008, Airship Surveillance plans to deploy two 1/3-scale flight demonstrators (known as the L 2). These flight demonstrators will provide proof-of-concept testing over the Tahoe Basin, as well as allow operational support training between fire crews and airship operators to occur. The planned performance for the L 2 is anticipated to be:

Speed: 40 knots
Ceiling: 7,000 feet
Duration: 9 Hours
Payload: 30 lbs

(It is acknowledged that this is just an interim, stopgap solution; however, since the L15 will not be available until the 2009 Fire Season, this will provide a limited capability.)

The 2009 Fire Season Onwards

The first L15 airships, which are capable of undertaking the full range of missions outlined in this report, can be available for deployment in time for the 2009 fire season if sufficient funding is available at an early point in the program.

The main performance capabilities of the L15 are:

Speed: 60 knots
Ceiling: 15,000 feet
Duration: 50 Hours
Payload: 1000lbs

AirSur, Ltd: AirSur is based in Las Vegas, NV. AirSur specializes in unmanned airships and is in the process of developing a series of airships that can carry payloads ranging from 30-1,000 pounds to altitudes of 3,000-15,000 feet (above sea level). AirSur has a cadre of experienced pilots, engineers and technicians,

who will are well versed in all aspects of the fabrication, manufacture, integration, test, and operations of airships. Further, AirSur's CEO is an active, fully qualified airship pilot with over 6,000 hours of flight time in virtually every airship in operations today. AirSur's experience base includes operations in the NAS and operation of multiple on-board sensors in support of a wide variety of sporting events and research missions.

Schedule

2008

Feb-Apr:

- Tahoe Basin requirements integrated into operational planning process
- Sensor/communications suites identified, integrated, & tested
- Ground Stations integrated and undergo compatibility testing
- First Responder operators enter training
- L 2 enters flight testing
- Final Design Review for L 15

Apr-Jun

- L 2 completes flight testing
- "Interim" Sensor Suite is integrated into L 2
- Integrated flight testing commences
- Hands on operator/analyst training with L 2
- Ground stations, communications equipment, and video monitors deployed to selected First Responder locations and to CA/NV Governors' offices.

Jun-Dec

- Initial Fire Watch Capability Deployed
- Ground stations, communications, and associated Fire Watch monitoring terminals operational
- First Watch First Responder personnel in-place and ready
- L-15 enters fabrication

2009

Jan-Jun

- L-15 begins integration
- L-15 completes integration and begins system level testing
- L-15 completes flight testing
- Fire Watch Sensor Suite integrated into L-15 equipment bay
- Fire Watch L-15 completes integrated flight testing

- Fire Watch L-15 deployed

Estimated Funding:

- L 2 Assembly, Integration, Testing: \$1.1M
- Sensor Suite Identification/Acquisition/Integration/Testing: \$.25M
- Fire Watch First Responder Training Courses: \$.3M
- Fire Watch Team Deployment Costs for L 2: \$.003M/day
- L 2 Operations & Maintenance (O&M) Costs: \$.1M/year
- Sensor Suite O&M Costs: \$.050M/year
- Total:
 - \$1.35M (Airship & Sensor Acquisition)
 - \$.15M/year (Airship & Sensor O&M Costs)
 - \$.003M/day (Deployment Costs)
- L-15 Design, Fabrication, Integration, Testing Costs: \$3M
- L-15/Fire Watch Sensor Suite Integration & Testing Costs: \$1.5M
- Fire Watch Team Deployment Costs for L-15: \$.005M/day
- L-15 Operations & Maintenance Costs: \$.2M/year
- Sensor Suite O&M Costs: \$.1M/year
- Total:
 - \$4.5M (Airship & Sensor Acquisition)
 - \$.3M/yr (Airship & Sensor O&M Costs)
 - \$.005/day (Deployment Costs)
- Airship Operating Base construction (Pahrump & Crows Landing): \$4M

Funding Source: California & Nevada State Governments will provide funding for Fire Watch. This funding will be augmented by Federal Agencies.

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